

Notice of Allowability

Application No.

10/660,697

Examiner

Jeffrey R. West

Applicant(s)

CHAMNESS, KEVIN ANDREW

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to the Amendment filed June 13, 2007.
2. ☒ The allowed claim(s) is/are 1-42, 47 and 48.
3. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 - a) ☐ All b) ☐ Some* c) ☐ None of the:
 1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

* Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.

THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

4. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
 5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
 - (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
 - 1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____.
 - (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.
- Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☒ Notice of References Cited (PTO-892)
2. ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3. ☒ Information Disclosure Statements (PTO/SB/08),
Paper No./Mail Date 03/21/07
4. ☐ Examiner's Comment Regarding Requirement for Deposit
of Biological Material
5. ☐ Notice of Informal Patent Application
6. ☐ Interview Summary (PTO-413),
Paper No./Mail Date _____
7. ☒ Examiner's Amendment/Comment
8. ☒ Examiner's Statement of Reasons for Allowance
9. ☐ Other _____

DETAILED ACTION

EXAMINER'S AMENDMENT

1. An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it **MUST** be submitted no later than the payment of the issue fee.
2. Authorization for this examiner's amendment was given in a telephone interview with Mr. Ronald A. Rudder on June 21, 2007.
3. The application has been amended as follows:
Claims 43-46, 49, and 50 have been cancelled.

Allowable Subject Matter

4. Claims 1-42, 47, and 48 are considered to be allowable over the cited prior art for the following reasons:

U.S. Patent Application Publication No. 2003/0055523 to Bunkofske et al. discloses a method of monitoring a processing system for processing a substrate during the course of semiconductor manufacturing (0002 and 0048), comprising acquiring data from said processing system for a plurality of observations, said data comprising a plurality of data parameters/variables (0049 and 0052); constructing a principal components analysis (PCA) model from said data (0047), including

centering and scaling (0056); determining at least one statistical quantity from said data using said PCA model (0043 and 0047); setting a control limit for said at least one statistical quantity (0059); comparing said at least one statistical quantity to said control limit (0059) in order to determine if the substrate processing remains within control during the course of manufacturing (0086), and providing an output assessing the process being performed in the processing system (0049 and 0053).

U.S. Patent Application Publication No. 2002/0107858 to Lundahl et al. teaches a method and system for the dynamic analysis of data using principal components analysis (0065) and further teaches performing centering and scaling comprising applying centering coefficients to each of a plurality data parameters by subtracting centering coefficients from each of said data parameters and applying scaling coefficients to each of a plurality of data parameters by dividing each of said data parameters by said scaling coefficients (0059 and 0060).

Li et al., "Recursive PCA for adaptive process monitoring" teaches a method and system for applying principal component analysis to the monitoring of industrial microelectronics manufacturing processing system (page 471, "Introduction", column 1, lines 1-4) including acquiring initial data from said processing system (page 473, "2.2 Recursive correlation matrix calculation", column 1, lines 1-4) for a plurality of observations from a first set of substrate runs having performed a process in the processing system (page 483, "Application to a rapid thermal annealing process",

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column 1, line 1 to column 2, line 12), constructing principal component analysis model from said data parameters of the first set (page 473, "2.2 Recursive correlation matrix calculation", column 1, lines 1-4), said PCA model being centered/scaled (page 472, "Introduction", column 1, lines 8-14), acquiring additional data from said processing system after said constructing step (page 473, "2.2 Recursive correlation matrix calculation", column 2, lines 1-16) from a second set of substrate runs performing said processing (page 483, "Application to a rapid thermal annealing process", column 1, line 1 to column 2, line 12), and adjusting the PCA model at the time of each observation of the additional data from the second set (page 471, "Introduction", column 2, lines 25-28 and page 474, "2.2 Recursive correlation matrix calculation", column 1, lines 11-13).

U.S. Patent No. 6,622,059 to Toprac et al. teaches an automated process monitoring and analysis system for semiconductor processing comprising acquiring data from said processing system for a plurality of observations, said data comprising a plurality of data parameters (column 4, lines 9-23), constructing a principal components analysis (PCA) model from said data (column 10, lines 46-51), acquiring additional data from said processing system, said additional data comprising an additional observation (i.e. current measurement) of said plurality of data parameters, obtaining a mean of the data parameters, and adjusting the mean of the data parameters to form an updated mean (column 18, lines 27-46).

U.S. Patent No. 5,796,606 to Spring teaches a process information and maintenance system for distributed control systems including means for obtaining data and from the data calculating/filtering a standard deviation using an exact recursive standard deviation employing an old value of the standard deviation, a current value of additional data, an old value of a mean, and a constant (column 6, line 41 to column 7, line 8).

U.S. Patent Application Publication No. 2003/0144746 to Hsiung et al. teaches control for an industrial process using one or more multidimensional variables comprising a first industrial process connected to a second industrial process and/or server via an internet for accessing data (0036, 0040, and 0045) wherein the data is used in performing principal component analysis (0066 and 0106).

With respect to claims 1-18, 25-42, 47, and 48, none of the cited prior art teaches or suggests, in combination with the other claimed limitations for a processing system for processing a substrate, constructing a PCA model from initial data parameters acquired from the processing system for a plurality of observations from a first set of substrate runs, the PCA model including centering coefficients for the initial data from the first set, acquiring additional data from the processing system, after construction of the PCA model, from a second set of substrate runs, adjusting the centering coefficients by utilizing both said initial data parameters and current data obtained from the additional data to produce updated adaptive centering

coefficients for each of said data parameters in said PCA model, applying said updated adaptive centering coefficients to each of said data parameters in said PCA model created from the first set of substrate runs and unchanged, and determining at least one statistical quantity using a combination of said unchanged PCA model and the additional data that has been centered by the updated adaptive centering coefficients.

With respect to claims 19-24, none of the cited prior art teaches or suggests, in combination with the other claimed limitations for a processing system for processing a substrate, an adaptive centering coefficient for a data parameter obtained during a current observation made after construction of a PCA model from a first set of substrate runs, said adaptive centering coefficient combining an old value of said adaptive centering coefficient and a current value of said data parameter for said current observation from a second set of substrate runs to produce at each observation of data an updated adaptive centering coefficient, at least one statistical quantity determined using a combination of said PCA model created from the first set of substrate runs and unchanged and additional data acquired after construction of the PCA model that has been centered by the updated adaptive centering coefficients, said updated adaptive centering coefficient implemented in the unchanged PCA model to provide, based on the statistical quantity, an improved process center for the substrate processing in order to update

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the substrate processing during the course of semiconductor manufacturing for the second set.


5. Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

6. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jeffrey R. West whose telephone number is (571)272-2226. The examiner can normally be reached on Monday through Friday, 8:30-5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Eliseo Ramos-Feliciano can be reached on (571)272-7925. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.



Jeffrey R. West
Primary Examiner
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September 4, 2007